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The Ferns of New Mexico

By E. O. Wooton and Paul C. Standley

The popular conception of New Mexico in the eastern and northern United States, often even among well educated people, is that it is nearly all a desert, where for most of the year high temperatures prevail. Very little is generally known, outside the State, of the large areas of agricultural land rendered productive by irrigation or by recently developed methods of dry farming, and still less of the great mountain ranges, best developed in the northern part, but reaching, as isolated masses of peaks, to the southern boundary. These ranges are similar to those of the states to the north and are fully equal in scenic effects to those of Colorado, so familiar to tourists. Some of the mountains of southern New Mexico, by reason of their precipitous, naked slopes, exhibit beauties of coloration which are unknown farther north. In the more elevated ranges in midsummer the climate is nearly ideal, although at altitudes of only 7500 to 8500 feet the temperature is often uncomfortably low. The highest peaks reach an elevation of slightly less than 14,000 feet, but scores of others, even near the Mexican and Texan border, are well above 10,000 feet.

While there is scarcely any part of the State where one is out of the sight of high mountains, the greater portion of its area of 122,000 square miles is composed

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of wide plains, having an altitude of from 3000 to 7000 feet, broken here and there by low hills. In southern New Mexico, at the lower altitudes, these plains support only a sparse vegetation, although even this furnishes forage to thousands of cattle; but in the northern part the plains are covered with grasses and other herbaceous vegetation characteristic of the Great Plains and the Great Basin.

If New Mexico were wholly arid one would expect its fern flora to be limited. The botanist acquainted only with the vegetation of the eastern and northern parts of the United States or that of the Pacific Slope, if he were seeking for ferns, would have hopes of finding at least a few in the higher mountains of the State. Strangely enough, most of our ferns are not found in the high mountains, but rather in the low arid ranges and foothills of the southern part of the State. The species which occur at higher altitudes are mostly those which have a wide distribution in North America, several of them extending to Eurasia. The fern flora of the arid mountains consists largely of species indigenous to the Southwest.

Ferns seem out of place in a xerophytic habitat, yet many of them grow nowhere else. A few miles southeast of Las Cruces is a low rounded mass of limestone known as Tortugas Mountain. Here, upon nearly bare, arid slopes, often among cacti, agaves, and other desert plants, grow five species of ferns. Several ferns are often associated with cacti in other places. Most of them are well fitted for existence in such situations by the thick texture of their fronds, which are often thickly covered with scales. In most cases the fronds, in arid locations, are involute or much shriveled under ordinary weather conditions, but when the summer rains fall they quickly unroll and growth again begins, although the period of moisture usually lasts for only a few days at a time.

The most interesting locality for ferns known in New Mexico is the Organ Mountains, near the Texan border. From this low, narrow range, only a few miles in length, none of whose peaks reach an elevation of 9,000 feet, twenty-three ferns and Selaginellas are known. This large number results partly from the fact that a great deal of collecting has been done in the region; but no doubt this range is exceptional in the State, especially in view of its small size. From the State as a whole forty-five ferns and fern allies are known, a number that compares favorably with the fern floras of most other states. In Rydberg's Flora of Colorado only forty species are listed. Doubtless Arizona possesses a larger number than New Mexico, for, when one considers the large number of diverse species discovered in that State in the last few years, it would seem that almost any North American species might ultimately be found there. It is remarkable that several characteristically northeastern ferns, such as *Dryopteris Dryopteris* and *Filix bulbifera* should occur in Arizona and not in New Mexico, which apparently lies in the natural path of their progress southwestward. There is still hope, however, that, when the mountains of our State have been more thoroughly explored, some of these species will be discovered.

1. POLYPODIUM HESPERIUM Maxon. A somewhat abnormal form of this species is known only from Brazos Canyon, Rio Arriba County.[1] It is possible that the same plant was collected also by Miss C. C. Ellis in the Sandia Mountains, but there is some doubt concerning the specimens, which are not now accessible.

2. BOMMERIA HISPIDA (Mett.) Underw. One of the characteristic ferns of the low arid mountain ranges. It is known from the Bear Mountains, Organ Mountains,

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[1]Amer. Fern Journal 4: 111.

Black Range, and Florida Mountains, and from Silver City. In the Organ Mountains it is very common, growing at the foot of granitic cliffs or boulders, or sometimes on protected slopes, usually in large colonies, and often intermingled with Selaginellas.

3. NOTHOLAENA BONARIENSIS (Willd.) C. Chr. [*N. ferruginea* (Desv.) Hook]. A species of wide distribution, extending, as the specific name indicates, as far south as Argentina. In New Mexico it has been discovered only in the arid Organ, Dona Ana, and Florida Mountains. It is found in the same environment as *Bommeria hispida*, the plants often forming large clumps.

4. NOTHOLAENA SINUATA (Sw.) Kaulf. Black Range, Bear Mountain, Carrizalillo Mountains, Big Hatchet Mountains, Florida Mountains, Organ and San Andreas Mountains, Tortugas Mountain, and Guadalupe Mountains. Reported also from near Las Vegas by Mr. Brandegee; but this record seems very doubtful, for the locality is far removed from the usual range of the species, in a very different floristic region. No other fern is better adapted to a xerophytic habitat than this, with its coriaceous fronds well protected by imbricated scales. On Tortugas Mountain, at an altitude of about 4000 feet, it receives not more than 8 or 10 inches of rain a year. Here it grows on parched limestone rocks, but in the Organs it is found about granitic cliffs.

5. NOTHOLAENA SINUATA INTEGERRIMA Hook. Black Range, Big Hatchet Mountains, Tortugas Mountain, Organ and San Andreas Mountains, Guadalupe Mountains, and Lakewood. In general appearance this is usually readily distinguishable, but, as pointed out by Mr. William R. Maxon, the form of the trichomes is essentially the same as in the typical form, consequently it cannot well be given specific rank. It differs commonly in its small, short, nearly entire pinnae and consequently narrower fronds. It ranges from western Texas to southern Arizona and northern Mexico, often growing

with the species. The differences in form do not appear to be the result of variations in environment, for on Tortugas Mountain, for instance, both grow under exactly the same conditions.

6. NOTHOLAENA STANDLEYI Maxon.[2] Common in nearly all the lower ranges from the Black Range and Socorro Mountain to the Dona Ana and Guadalupe Mountains, and southward. Reported also from Las Lagunitas, near Las Vegas, by Mr. Brandegee; but it scarcely seems possible that the species can be found in such a remote locality. This is one of the most characteristic and handsome ferns of the low, arid mountains, growing on both limestone and granitic rocks. Commonly, in the dry weather that usually prevails, the fronds appear shriveled, but in damp weather, or if placed in water, they quickly resume a plane form.

7. NOTHOLAENA DEALBATA (Pursh) Kunze. Big Hatchet Mountains, Black Range, Santo Domingo, Sandia Mountains, Burro Mountains, and Tortugas Mountain. Reported from Las Lagunitas near Las Vegas by Mr. Brandegee. Although it occurs in these widely separated localities, this is found only locally. It is very abundant on Tortugas Mountain, on very dry limestone rocks, but strangely enough it is not known from the nearby Organs. So far as known, this fern is confined to limestone in New Mexico.

8. NOTHOLAENA FENDLERI Kunze. Santa Fe, Sandia Mountains, Cimarron Canyon, and Socorro. Apparently this is very rare in the State, and neither of the writers has ever found it. The type was collected by August Fendler, probably somewhere about Santa Fe, in 1847. The species reaches the southern limit of its range in New Mexico, and is said to be more common in Colorado.

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[2] This name has been proposed recently for the fern known usually as *Notholaena Hookeri* D. C. Eaton. See, AMERICAN FERN JOURNAL, **5**: 1. 1915.

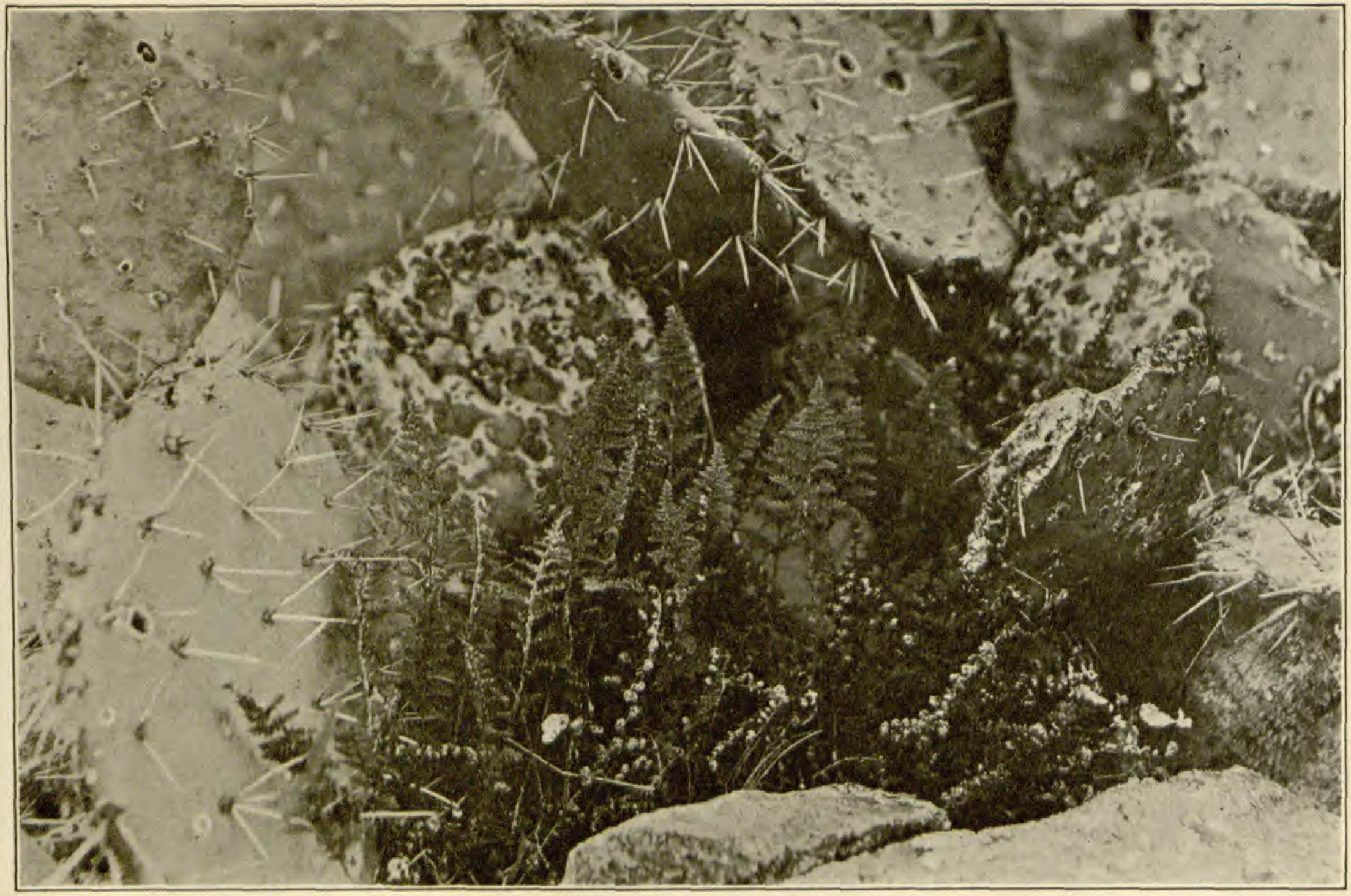
9. ADIANTUM CAPILLUS–VENERIS L. Known from only four localities: East Fork of the Rio Gila, in the Mogollon Mountains; Kingston; San Andreas Mountains; and a station eight miles northwest of Reserve, beside a warm spring. It is strange that this fern has not been found in the mountains of the northern part of the State, where conditions seem to be much better suited to its growth.

10. ADIANTUM MODESTUM Underw. The type was collected on the banks of South Spring River, near Roswell, by Prof. F. S. Earle (No. 261). It grows at a lower altitude than any other New Mexican fern, being the only one found away from mountains or hills. It is doubtful whether this is sufficiently distinct from *A. Capillus-Veneris* to deserve recognition as a species, and the question cannot be settled until the North American forms of that cosmopolitan fern have been more carefully studied. It is improbable that this form is confined to a single locality, but it has not been found elsewhere in New Mexico.

11. PTERIDIUM AQUILINUM PUBESCENS Underw. The pubescent form of the bracken grows in all the higher mountains of the State, often in great abundance, usually at altitudes of 7500 to 8500 feet.

12. CHEILANTHES WRIGHTII Hook. Of very local occurrence, being known only from the Telegraph Mountains (*Wooton*), Bear Mountains (*Rusby*), and Conde's Camp, near the southwest corner of the State (*Wright* 2128). In general appearance it is very unlike our other species of Cheilanthes, the fronds being bright green and glabrous. Southwestern New Mexico is probably the northeastern limit of the range of this species, which is more common in the dry mountains of southeastern Arizona.

13. CHEILANTHES FEEI Moore. Abundant locally, at middle or low altitudes in the mountains and hills



Cheilanthes Eatoni growing about an Opuntia, in the Organ Mountains

nearly throughout the State. It is often found in very arid situations and usually, but not always, it grows on limestone, frequently in crevices of vertical or overhanging cliffs.

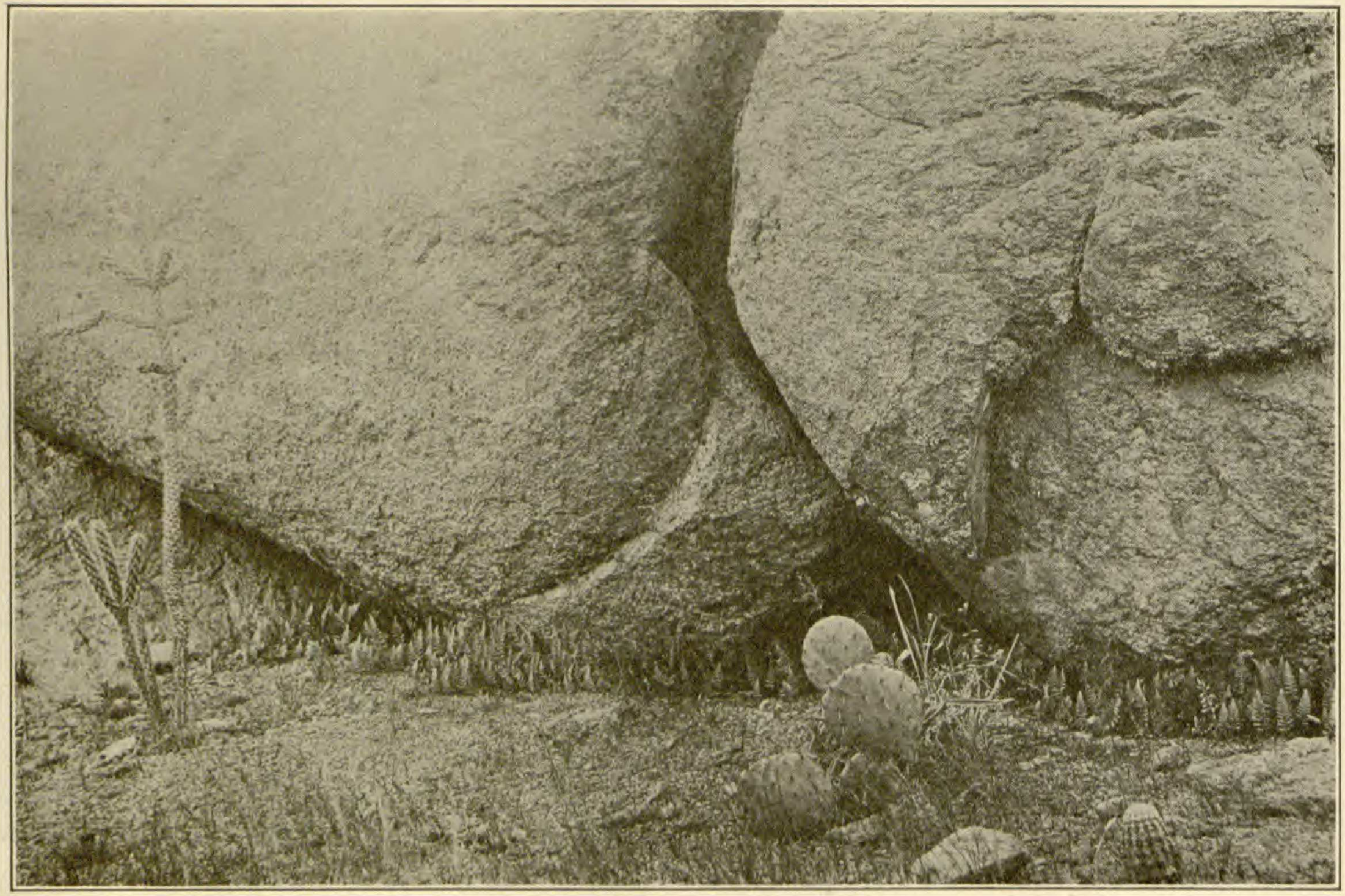
14. CHEILANTHES EATONI Baker. This unattractive fern has been collected in nearly all the mountain ranges in the State, except those in the northwest corner. In the Organ and Dona Ana Mountains it is found in arid situations at an altitude of not more than 6000 feet, but on San Mateo Peak and Hillsboro Peak it extends up to 9000 feet. It is probably more often met than any other species in the drier mountains of the State.

15. CHEILANTHES FENDLERI Hook. Frequent in most of the mountain ranges, extending up to 9000 feet in places. The type was collected by Fendler in 1847, somewhere about Santa Fe.

16. CHEILANTHES MYRIOPHYLLA Desv. Of local distribution, known only from the Black Range, Big Hatchet Mountains, the south end of the Organ Mountains, and the Sacramento Mountains, near Alamogordo (*Ferriss*). On Bishops Cap in the Organ Mountains it grows on limestone, in a very arid environment.

17. CHEILANTHES LINDHEIMERI Hook. Burro Mountains, Telegraph Mountains, Carlisle, Tres Hermanas, Florida Mountains, and Organ Mountains, at low altitudes. In the Organ Mountains it is very abundant, in the shade of granitic cliffs. It is perhaps our handsomest species of the genus because of the broad fronds of a rather peculiar color. Usually it grows in large colonies, the fronds standing perfectly erect.

18. PELLAEA INTERMEDIA Mett. Burro Mountains, Black Range, Tortugas Mountain, and the San Andreas and Organ Mountains. This is another fern of arid situations, growing usually on limestone. It is not as common as the number of localities might seem to suggest, never appearing very abundantly at any one station.



Cheilanthes Lindheimeri, with three species of cacti, in the Organ Mountains.

19. PELLAEA SCABRA C. Chr. [*P. aspera* (Hook.) Baker]. Known only from the "Copper Mines" (Santa Rita), a classic locality for New Mexican plants, where Wright and Bigelow collected the types of many common southwestern species. This fern was collected here by both these collectors, in the early fifties, but it has not been found in the State more recently.

20. PELLAEA ATROPURPUREA (L.) Link. Black Range, San Luis Mountains, Bear Mountain, Florida Mountains, Mangas Springs, Organ Mountains, Guadalupe Mountains, and on the highest point of the Llano Estacado. In the Organ Mountains it grows under thickets among granitic rocks, but elsewhere it usually frequents crevices and ledges of limestone cliffs.

21. PELLAEA PULCHELLA (Mart. & Gal.) Fée. Collected in New Mexico but once, in the Guadalupe Mountains near Queen (*Wooton*), in crevices of limestone rocks. This beautiful little fern is abundant in the region mentioned and is evidently very much at home.

22. PELLAEA TERNIFOLIA (Cav.) Link. Specimens possibly referable here were collected in the Organ Mountains by Wooton in 1891. It is possible that they are only a depauperate form of *P. mucronata*, for the species has not been found since in this range, although much collecting has been done there. Dr. Underwood reported it from Socorro (*Plank*), and Mr. M. E. Jones states that he found it at Silver City. The species is not uncommon in Chihuahua, and there is every reason for expecting it in New Mexico.

23. PELLAEA MUCRONATA (D. C. Eaton) C. Chr. [*P. Wrightiana* Hook.]. Sandia Mountains, Socorro, Santa Rita, Burro Mountains, Florida Mountains, and Dona Ana and Organ Mountains. Common at low altitudes. The type of *P. Wrightiana* was collected by Wright (No. 2130) at Santa Rita, or at least the Wright

specimens of the type number in the Gray Herbarium are from that locality. The species is quite common and is to be expected in most of the granitic mountains of the State in the oak and juniper zone.

24. CRYPTOGRAMMA ACROSTICHOIDES R. Br. Known only from Brazos Canyon, Rio Arriba County (*Standley*).[3]

25. ASPLENIUM SEPTENTRIONALE (L.) Hoffm. Known from Brazos Canyon (*Standley*), Cimarron Canyon (*Griffiths*), Sierra Grande (*Standley*), highest point of the Llano Estacado (*Vernon Bailey*), Santa Rita (*Wright* 2122), and Ben Moore, near Santa Rita (*Bigelow*). In crevices on the under side of rocks; probably not so rare as the records indicate, but overlooked by collectors.

26. ASPLENIUM RESILIENS Kunze. Rare in New Mexico, but known from Santa Rita (*Wright* 2121, in part), Florida Mountains (*Ferriss*), and Organ Mountains (*Wooton, Standley*). Growing in the Organs in crevices of granitic rocks.

27. ASPLENIUM TRICHOMANES L. Brazos Canyon, Santa Fe and Las Vegas Mountains, Mogollon Mountains, Santa Rita, and Organ Mountains. Usually at higher altitudes, on moist shaded cliffs.

28. ATHYRIUM CYCLOSORUM Rupr. Brazos Canyon, Upper Pecos River, and Mogollon Mountains, usually along water. Very rare on the Upper Pecos, but abundant in the other two regions. It reaches the largest size of any fern in the State.

29. DRYOPTERIS FILIX-MAS (L.) Schott. Brazos Canyon, Las Vegas Mountains, Ruidoso Creek in the White Mountains, and Organ Mountains, commonly in fissures of shaded canyon walls.

30. PHANEROPHLEBIA AURICULATA Underw. Probably this is the rarest fern of the State, for it is known from a single canyon in the Organ Mountains. Only

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[3] See Amer. Fern Journal 4: 112.

a few plants are found even here, growing in shaded soil about granitic cliffs. It is the northermost representative of a small genus, most of whose species are of much more southern distribution.[4] It is probable that the fern is doomed to extinction in New Mexico, for the locality where it grows is a favorite spot for picnics, and ferns in such a place always suffer.

31. FILIX FRAGILIS (L.) Underw. Perhaps our commonest fern, common in all the higher mountains of the State, but only in the higher ones. It is not known from any of the low ranges of the southwest corner.

32. WOODSIA MEXICANA Fée. Brazos Canyon, Upper Pecos River, Rio Pueblo, Sandia Mountains, Magdalena Mountains, Mogollon Mountains, Organ Mountains, Santa Rita, and White Mountains. On moist shaded cliffs, or rarely in exposed situations.

33. WOODSIA SCOPULINA D. C. Eaton. Brazos Canyon (*Standley*).[5]

34. WOODSIA PLUMMERAE Lemmon. Known only from the Burro Mountains, where it was collected by Dr. H. H. Rusby in 1881.

35. MARSILEA VESTITA Hook. & Grev. Collected in the Guadalupe Mountains, near Queen, by Wooton. It was collected by Wright in the vicinity of El Paso, Texas, not far from the New Mexican border.

[In the United States National Herbarium there is a specimen of *Marsilea uncinata* A. Br. obtained by one of the collectors of the Mexican Boundary Survey. The published report states that Dr. Bigelow collected the species somewhere in New Mexico. Although very small this specimen is probably correctly determined, and possibly the species should be credited to the State.]

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[4]See Underwood, Bull. Torrey Club **26**: 205-216. 1899; also Maxon, Bull. Torrey Club **39**: 23-28. 1912.

[5]See Amer. Fern Journal **4**: 112.

36. AZOLLA CAROLINIANA Willd. Obtained on Animas Creek in the Black Range by Mr. O. B. Metcalfe (No. 1110) in 1904. Probably it will be found in other localities if searched for carefully.

37. EQUISETUM ARVENSE L. Chama, Brazos Canyon, Taos Mountains, Upper Pecos River, Zuni Mountains, and Mogollon Mountains. Often very abundant along streams in the higher mountains.

38. EQUISETUM LAEVIGATUM A. Br. Common in most of the higher mountains, along streams and in the "ciénagas" or marshes. It has been collected also in the Mesilla Valley, at an altitude of 3800 feet, and near Albuquerque.

39. EQUISETUM HYEMALE L. Gallinas River near Las Vegas (*Cockerell*), Reserve (*Wooton*), along the Rio Grande near Mesilla (*Standley*), Gilmores Ranch in the White Mountains (*Wooton and Standley*). Sometimes growing along banks of irrigating ditches. Our material belongs to the form described as *E. hyemale intermedium* by Mr. A. A. Eaton.

40. EQUISETUM ROBUSTUM A. Br. Mogollon Mountains (*Rusby* 416) and along ditch banks near Mesilla (*Wooton* 38).

41. SELAGINELLA RUPINCOLA Underw. San Luis Mountains, Dog Spring, Guadalupe Pass, and Organ Mountains. The type was collected in the Organ Mountains by Wooton (No. 124) in 1897. It is abundant in the range, forming large mats on granitic ledges.

42. SELAGINELLA DENSA Underw. On the Upper Pecos near Winsor's Ranch (*Standley* 4153), and on Hillsboro Peak of the Black Range (*Metcalfe* 1172). This was found in only one locality on the Upper Pecos, growing on an exposed ledge at an altitude of about 8300 feet.

43. SELAGINELLA WRIGHTII Hieron. Collected at Las Vegas (*Plank* in 1895) and at Lakewood (*Wooton*

in 1909). The specimens from Lakewood grew on gypsum soil, alongside a new species of Eriogonum lately described by the writers as *E. gypsophilum*.

44. SELAGINELLA MUTICA D. C. Eaton. Pecos (*Standley* 5199), Ojo Caliente at the head of Canada Alamosa (*Wooton*), Florida Mountains (*Ferriss*), and Organ Mountains (*Bigelow, Wooton, Standley*).

45. SELAGINELLA UNDERWOODII Hieron. [*S. rupestris Fendleri* Underw.]. Santa Fe and Las Vegas Mountains, Brazos Canyon, Ramah, Folsom, Mogollon Mountains, Black Range, Organ Mountains, White Mountains. Our most widely distributed species, often very abundant. The type was collected near Santa Fe, by Fendler. This and the preceding species, together with *S. rupincola*, are very abundant in the Organ Mountains, on shaded cliffs or ledges, the three growing together, often in the same mats. During the dry season the plants are dormant, with the leaves closely appressed; but when the rains come in July, August, and September, the leaves quickly take on a greener hue and spread from the stems.

A single specimen in the United States National Herbarium of a species allied to *Selaginella arenicola* Underw. purports to come from Las Vegas. There is considerable doubt, however, whether the label is correct, and we prefer to neglect this record until it is substantiated by another collection.

The Resurrection plant, *Selaginella lepidophylla*, will probably be found sometime in southern New Mexico, perhaps in the Guadalupe Mountains, for it is known to grow in Texas, not far from our southern border.